

### Abstract of the Disclosure

Method and apparatus for testing ultralow moisture permeation through a sample such as a thin barrier film by exposing one surface of a sample to be tested for moisture permeation to a predetermined humidity of HTO. The HTO permeating therethrough is collected in a stream of dry gas, preferably methane, at a known very slow flow rate, and monitored for its radioactivity content. By very carefully sizing the respective chambers, continuously monitoring using a particularly sensitive device and appropriately converting the signals, accurate assessment of permeation rates even as low as very small fractions of a gram of water per square meter per day can be obtained. Ultralow oxygen permeation is alternatively measured using  $^{14}\text{CO}$ . Methods are also shown for measuring permeation that would occur through a perimeter seal and for measuring permeation which would result from gaseous entry into edge surfaces of a composite film.